Apple – Plum Curculio (Conotrachelus nenuphar): Effective plum curculio monitoring using lures

Introduction: One of the greatest challenges to effective management of plum curculio (PC) in commercial apple orchards in the northeast has been to determine the need and timing of insecticide applications that will protect fruit from injury by adult PCs. The identification of an effective attractant composed of benzaldehyde (= BEN, a plant-based volatile) and grandisoic acid (= GA, the PC synthetic aggregation pheromone) led to the development of an effective monitoring system for PC involving the odor-baited trap tree approach, developed by the late R.J. Prokopy about two decades ago.

This approach calls for baiting selected perimeter-row trap trees with GA plus BEN, which results in aggregations of adult PCs within the canopies of those trees. A monitoring technique, based solely on observation of fresh PC injury on fruit from odor-baited trees, has proven effective and efficient at determining the need for and appropriate timing of perimeter-row insecticide sprays against PC after whole-block petal fall sprays.

What do I need to set up odor-baited trap trees?

Each trap tree provides useful information on PC activity for 1-3 acre blocks. Commercial formulations of BEN (four dispensers are needed) and GA (one dispenser is needed) are available. Here is one supplier, others may be available: AgBio, Inc. (Westminster, CO; phone: (303) 469-9221; E-mail: agbio@agbio-inc.com).

Other materials needed: flagging tape (to flag 25 fruit clusters), one Sharpie.

Step-by-step procedure:

(1) During full bloom, deploy 1 GA dispenser and 4 BEN dispensers on the perimeter-row trap tree you selected (try to choose a tree that has plenty of bloom). The lures should be evenly distributed among branches near the tree center and hung at about chest to head height within a yard or so of the tree center. The lures can be left unattended through the rest of the PC season. The pheromone (GA) dispenser is tent-shaped and is best deployed with the opening facing down by using a binder clip to attach the dispenser to a branchlet. Each BEN dispenser is placed inside an inverted colored plastic cup to protect against degradation by UV light. The wire holding the dispenser protrudes through a hole in the base of the inverted cup to allow easy deployment of both by hanging from a branch.

(2) Just before applying the petal-fall spray, randomly select 25 fruit clusters located slightly above head high and at the periphery of the canopy. Tie tightly an orange or pink ribbon 2 inches or so from each cluster. Within each cluster, the king fruit will serve as the designated fruit for bi-weekly inspection of PC injury.

(3) Number each cluster on the ribbon from 1-25 using a Sharpie. On M.9 trees, it may be hard to establish 25 clusters on the same tree. If so, go to either of the two nearest trees in same row and establish needed clusters there.

(4) At petal fall, apply insecticide to the entire block.
(5) Twice a week starting soon after the petal fall spray, sample each of the 25 clusters. Look at the king fruit on a cluster and score it as scarred or not scarred by a PC oviposition. Use the Sharpee to circle each scar to indicate that the fruit has already been damaged. If the king fruit is gone, then count as data only the first lateral fruit you examine in the cluster. Please follow this pattern for each of the 25 clusters until you have 25 fruit in the data set.

(6) The simple approach calls for a peripheral-row spray when a threshold of 1 fresh egg-laying scar per 25 fruit is reached.

(7) Remember: Blocks having odor-baited trap trees receive a whole-plot insecticide spray by the time of petal fall and succeeding sprays (if needed) are applied to peripheral-row trees only when the threshold value of 1 fresh PC egg-laying scar out of 25 fruit sampled from the trap tree has been reached.

Left: Odor-baited trap tree with 25 fruit clusters flagged. Within each cluster, the king fruit is inspected twice a week for signs of fresh PC scars. Right: After the petal fall spray, the presence of 1 FRESH egg-laying scar (out of 25 fruits sampled) triggers an insecticide spray applied to peripheral-row trees only. Trap trees are excellent indicators of the extent to which insecticide residue remains effective. Photo credits: Jon Clements and J. Piñero, UMass Extension.

The effectiveness of the above approach has been validated throughout New England and New York. In multiple years of research, the level of PC injury to fruit sampled from perimeter or interior-row trees in trap tree plots did not differ significantly from that recorded in plots subject to conventional management. If you are interested in reading the full article reporting on this research, click here.

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